NEWS from ARO-FE (March 2002):

Producing Ceramics, with Unidirectional Properties, via Magnetic Field Generated by a Super-Conducting Magnet.

From Nikkei Sangyou Shimbun, 7 November 2001.
Also, from the Jan '02 ARO-FE interview with Prof. Keizo Uematsu:
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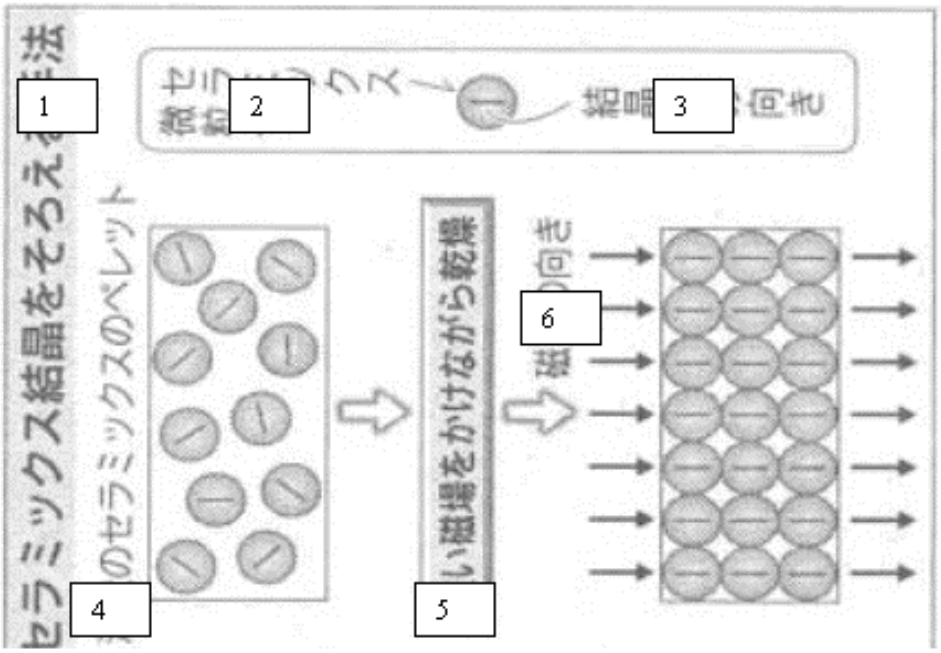
Prof. Keizo Uematsu of the Nagaoka University of Technology (URL:www.nagaokaut.ac.jp/) and his colleagues have developed a technique for aligning fine particle ceramics in the direction of the crystal axis of the ceramics. The sample used in the experiment was aluminum oxide. Aluminum oxide was put into distilled water with the ammonium polyacrylic acid (dispersing agent) and mixed well for 24 hours. The raw material, thus prepared, was slipped into mold to make pellet with diameter of 5 cm and thickness of 1 cm and then dried under a strong magnetic field of ~ 10 tesla using a super-conducting magnet. The magnetic field caused the axes of the ceramic crystals to become parallel to the line of magnetic force. Fine particles ceramics, 1.0μm diameter, subjected to this experiment showed that a majority of the particles realigned in the direction of the crystal's axis. When this material was sintered, at high temperature, the resulting final product had unidirectional properties. Parts produced by this method are particularly useful in applications employing piezoelectric ceramics, electronic material in portable telephone using for instance PZT apparatus for generation of ultrasonic wave and others. In these cases, the complete alignment of the ceramics particles with their crystal axes significantly enhances the performance of devices. Prof, Uematsu is now making effort to extend the application of the method for broader material systems thus opening new areas of applications.



LEGEND:

1. Method for aligning the Crystal Axis of Ceramics
2. Fine particles of Ceramics
3. Direction of Crystal Axis
4. Pellet of Slurry Ceramics
5. Drying While Being Subjected to Magnetic Field
6. Direction of Magnetic Field